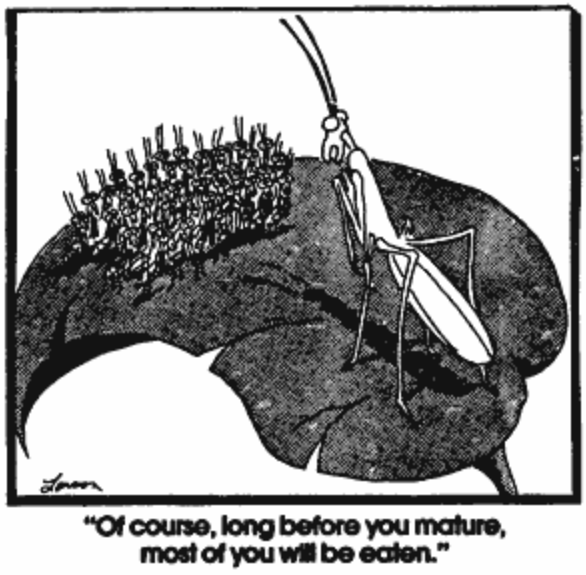
Evolution Review

1. Which evolutionary concept is best illustrated by the cartoon below?

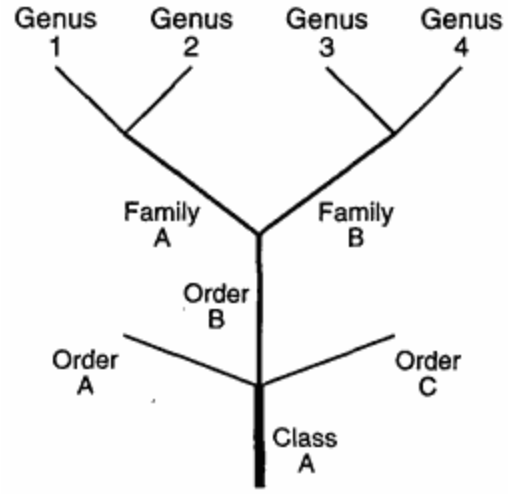


1) production of mutations
2) use and disuse
3) survival of the fittest
4) speciation

2. The term "evolution" is best described as

1) a process of change in a population through time
2) a process by which organisms become extinct
3) the reproductive isolation of members of certain species
4) the replacement of one community by another

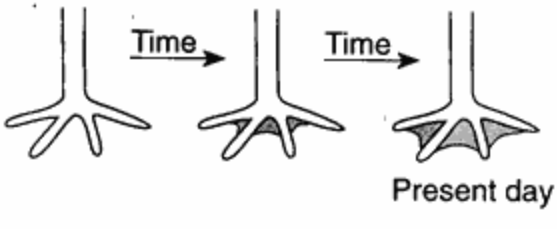
3. The diagram below shows the evolutionary relationships between several groups of organisms.



Organisms with the greatest biochemical similarities would most likely be found in which pair of genera?

1) 1 and 3
2) 2 and 3
3) 3 and 4
4) 1 and 4

4. The changes in foot structure in a bird population over many generations are shown in the diagram below.



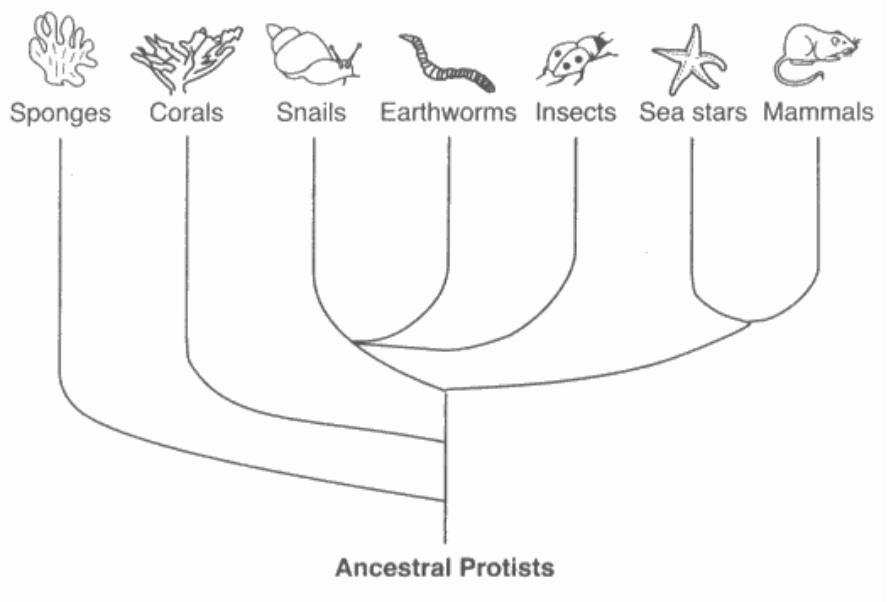
These changes can best be explained by the concept of

1) evolution
2) extinction
3) stable gene frequencies
4) use and disuse

5. If the same antibiotic is used too many times, it can become less effective against a certain type of bacteria. This observation is best explained by the

1) presence of pathogens in antibiotics
2) production of antibiotics by white blood cells
3) replication of viruses that attack bacteria
4) survival and reproduction of unaffected bacteria

6. The diagram below represents possible evolutionary relationships between groups of organisms.



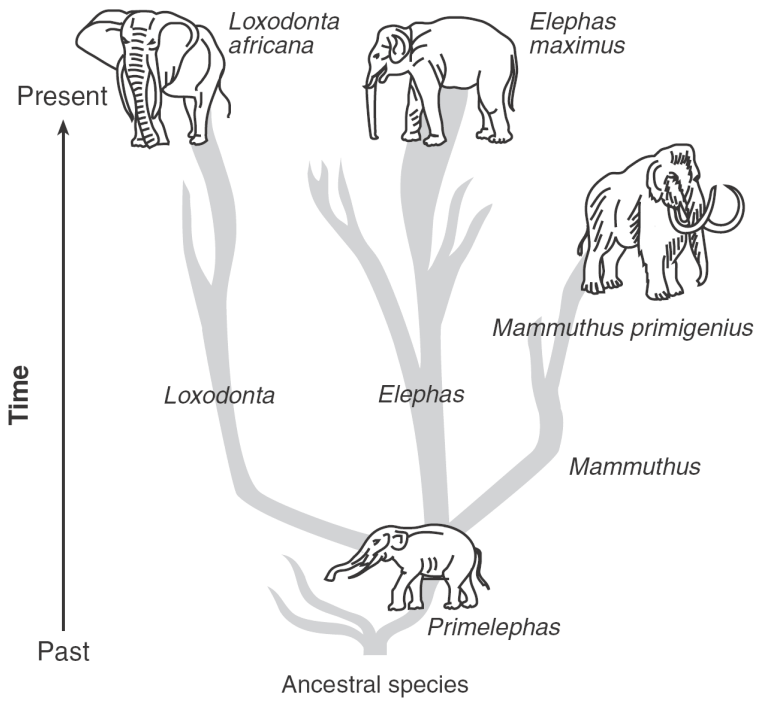
Which statement is a valid conclusion that can be drawn from the diagram?

1) Snails appeared on Earth before corals.
2) Sponges were the last new species to appear on Earth.
3) **Earthworms and sea stars have a common ancestor.**
4) Insects are more complex than mammals.

7. Young birds that have been raised in isolation from members of their species build nests characteristic of their species. This suggests that the nest-building behavior is

1) **genetically inherited from parents**
2) learned by watching members of their species
3) a disadvantage to the survival of the species
4) a direct result of the type of food the bird eats

8. One possible pathway for the evolution of elephants is represented in the diagram below.



Which statement concerning this pattern of evolution is correct?

1) Evolution always results in favorable traits.
2) **Evolution does not always result in a species that will survive to present time.**
3) Evolution leads to less complex organisms.
4) Evolution results in the same changes in all species.

9. Which statement is best supported by the theory of evolution?

1) Genetic alterations occur every time cell reproduction occurs.
2) The fossil record provides samples of every organism that ever lived.
3) **Populations that have advantageous characteristics will increase in number.**
4) Few organisms survive when the environment remains the same

10. Which concept is referred to in the cartoon below?

"Listen . . . I'm fed up with this 'weeding out the sick and the old' business . . . I want something in its prime."

1) the lock-and-key model
2) use and disuse
3) the heterotroph hypothesis
4) natural selection

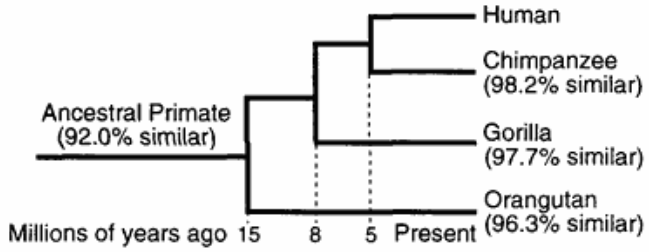
11. A researcher recently discovered a new species of bacteria in the body of a tubeworm living near a hydrothermal vent. He compared the DNA of this new bacterial species to the DNA of four other species of bacteria. The DNA sequences came from the same part of the bacterial chromosome of all four species.

Species	DNA Sequence
unknown species	ACT GCA CCC
species I	ACA GCA CCG
species II	ACT GCT GGA
species III	ACA GCA GGG
species IV	ACT GCA CCG

According to these data, the unknown bacterial species is most closely related to

1) species I
2) species II
3) species III
4) species IV

12. The diagram below shows a comparison of nitrogen base sequences in the DNA of some organisms to those of a human.



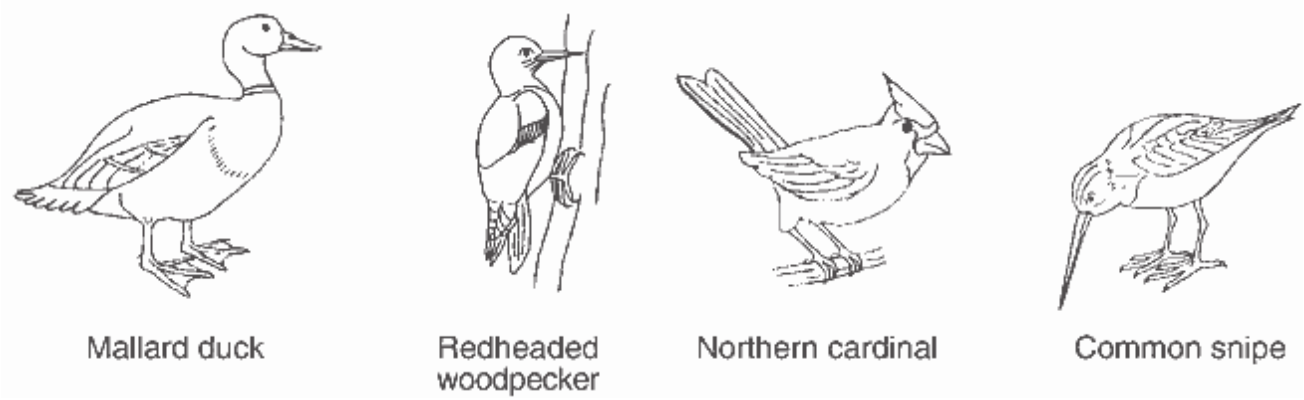
According to this diagram, humans may be most closely related to the

1) ancestral primate
2) chimpanzee
3) gorilla
4) orangutan

13. When changes occur in the genes of sex cells, these changes

1) lead to mutations in the parent organism
2) are always harmful to the offspring
3) can be the basis for evolutionary change
4) only affect asexually reproducing organisms

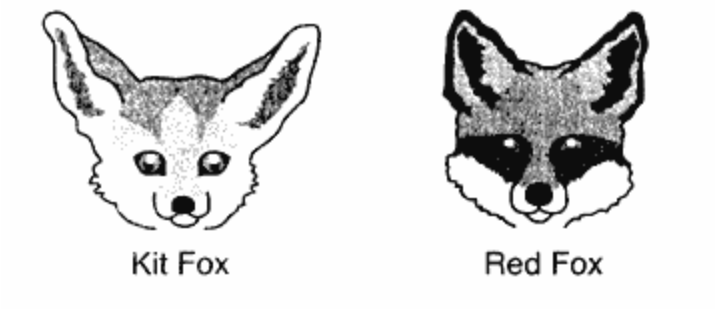
14. The diagram below represents four different species of wild birds. Each species has feet with different structural adaptations.



The development of these adaptations can best be explained by the concept of

1) inheritance of resistance to diseases that affect all these species
2) inheritance of characteristics acquired after the birds hatched from the egg
3) natural selection
4) selective breeding

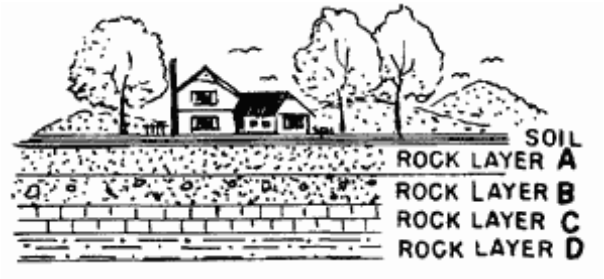
15. The kit fox and red fox species are closely related. The kit fox lives in the desert, while the red fox inhabits forests. Ear size and fur color are two differences that can be observed between the species. An illustration of these two species is shown below.



Which statement best explains how the differences between these two species came about?

1) Different adaptations developed because the kit fox preferred hotter environments than the red fox.
2) As the foxes adapted to different environments, differences in appearance evolved
3) The foxes evolved differently to prevent overpopulation of the forest habitat.
4) The foxes evolved differently because their ancestors were trying to avoid competition.

16. A geologist finds fossils in each of the undisturbed rock layers represented in the diagram below. The fossils are all structurally similar. Which is the most likely conclusion that the geologist would make?



1) All the fossils are of the same age.
2) The relative ages of the fossils cannot be determined.
3) **The fossils in rock layer *D* are older than those in layer *A*.**
4) The fossils in rock layer *B* are older than those in layer *C*.

17. Which statement would most likely have used by Lamarck to explain the development of the long trunk in elephants?

1) **Elephants stretched their trunks to reach food supply and this longer trunk was passed on.**
2) A mutation occurred and its frequently increased in later generations.
3) Elephants with longer trunks had a higher survival rate and the longer trunk was passed on
4) Elephants with short trunks were mostly sterile.

18. The embryos of fish, chickens, and pigs have gill slits and a tail. The presence of these features suggests that

1) all these animals can swim
2) pigs developed from chickens
3) **these animals may have had a common ancestor**
4) gill slits and tails are required for embryonic development

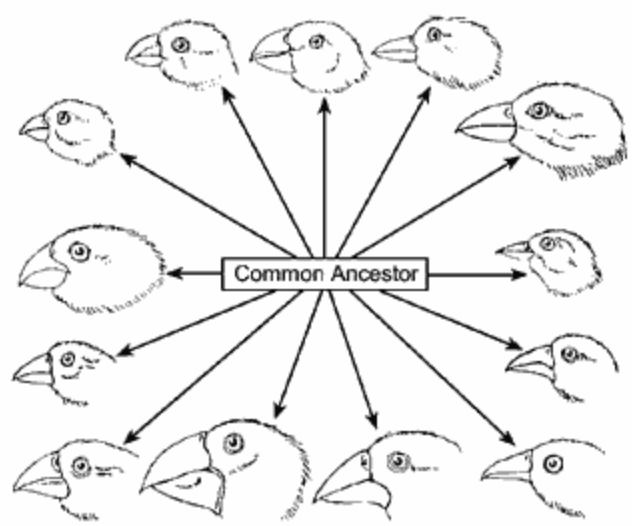
19. Modern evolutionary theory consists of the concepts of Darwin modified by knowledge concerning

1) overpopulation
2) **the genetic basis of variation**
3) survival of the fittest
4) competition

20. Which statement is *most closely* related to the modern theory of evolution?

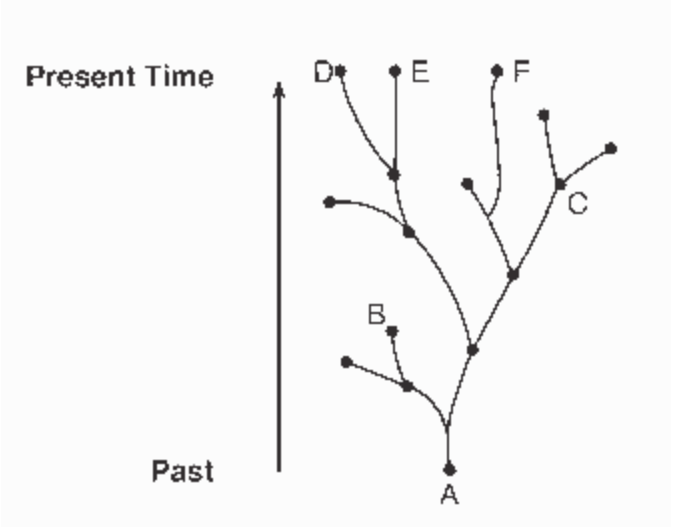
1) Characteristics that are acquired during life are passed to offspring by sexual reproduction.
2) Evolution is the result of mutations and recombination, only.
3) **Organisms best adapted to a changed environment are more likely to reproduce and pass their genes to offspring.**
4) Asexual reproduction increases the survival of species.

21. The diversity within the wild bird species in the diagram below can best be explained by which process?



1) **natural selection**
2) asexual reproduction
3) ecological succession
4) mitotic cell division

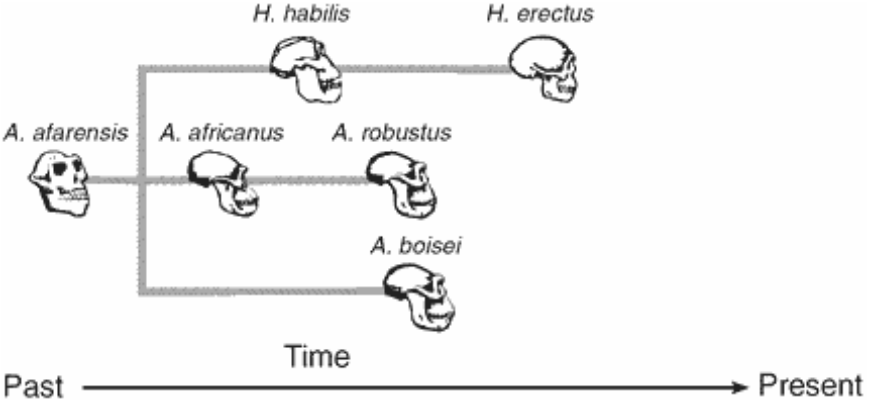
22. The diagram below illustrates possible evolutionary pathways of some species.



Which statement is a valid inference based on the information in the diagram?

1) Species *A* is the common ancestor of all life on Earth.
2) **Species *D* is more closely related to species *E* than to species *F.***
3) Species *B* is the ancestor of species *F.*
4) Species *C* is the ancestor of species that exist at the present time.

23. According to the diagram below, which three species lived on Earth during the same time period?

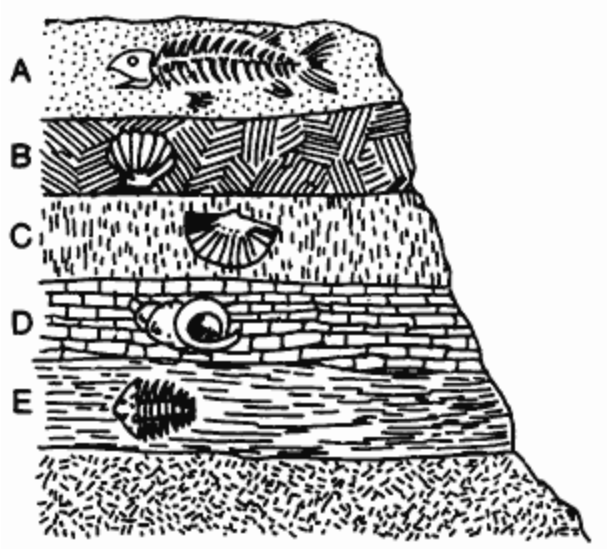


1) *robustus, africanus, afarensis*
2) *habilis, erectus, afarensis*
3) ***habilis, robustus, boisei***
4) *africanus, boisei, erectus*

24. In a certain area of undisturbed layers of rock, fossils of horseshoe crabs may be found in the upper layer, and a lower layer contains fossils of trilobites. Trilobites are extinct aquatic arthropods resembling modem horseshoe crabs. This information suggests that

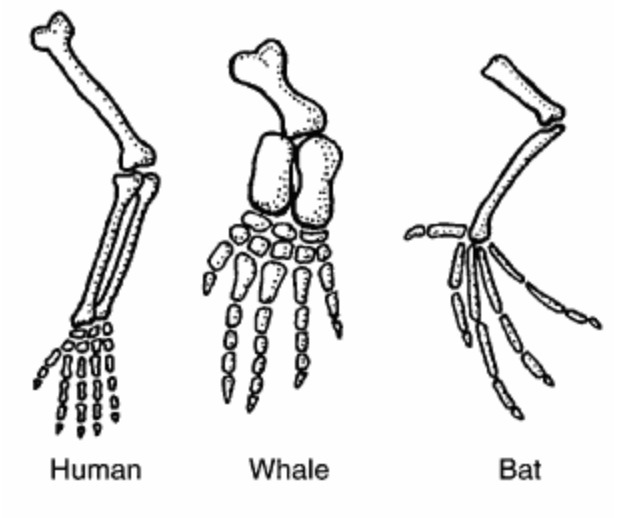
1) horseshoe crabs will soon become extinct
2) horseshoe crabs and trilobites are completely unrelated organisms
3) horseshoe crabs may have evolved from trilobites
4) trilobites may have evolved from horseshoe crabs

25. In the diagram below of undisturbed sedimentary rock strata, in which rock layer are the fossils of more complex animals generally found?



1) ***A*** 2) *B* 3) *E* 4) *D*

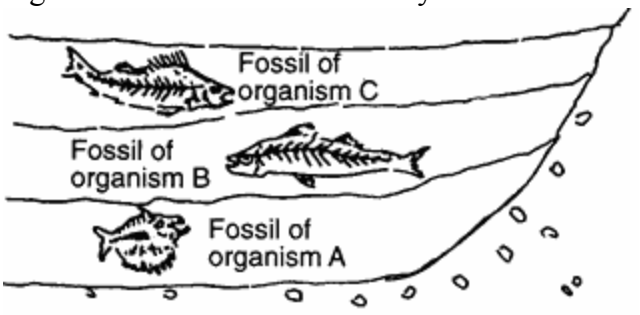
26. The diagrams below show the bones in the forelimbs of three different organisms.



Which hypothesis do the differences in the bone arrangements support?

1) These organisms are members of the same species.
2) These organisms may have descended from the same ancestor.
3) These organisms have adaptations to survive in different environments.
4) These organisms all contain the same genetic information.

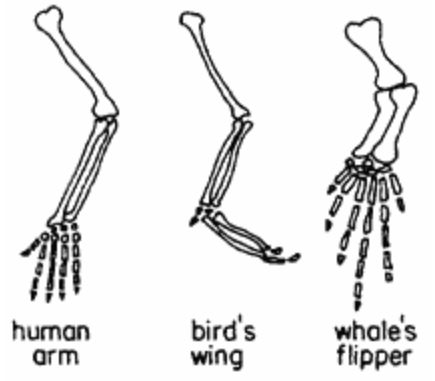
27. The diagram below represents undisturbed rock strata in a given region. A representative fossil of an organism is illustrated in each layer.



Which statement best describes a relationship between these representative organisms?

1) Organism *A* was probably more structurally advanced than organism *B* and organism *C*.
2) Organism *C* probably gave rise to organism *A* and organism *B*.
3) All of these organisms probably evolved at the same time.
4) **Organism *A* was probably more primitive than organism *B* and organism *C*.**

28. The diagrams below illustrate three homologous structures.



The structural similarities represented in the diagrams are considered supporting evidence for

1) the heterotroph hypothesis
2) **a common ancestry**
3) use and disuse
4) geographic isolation

29. A species that lacks the variation necessary to adapt to a changing environment is more likely to

1) develop many mutated cells
2) **become extinct over time**
3) begin to reproduce sexually
4) develop resistance to disease

30. Extinction of a species could result from

1) evolution of a type of behavior that produces greater reproductive success
2) synthesis of a hormone that controls cellular communication
3) **limited genetic variability in the species**
4) fewer unfavorable mutations in the species

Base your answers to questions **31** through **33** on the information below and on your knowledge of biology.

Rabbits eat plants and in turn are eaten by predators such as foxes and wolves. A population of rabbits is found in which a few have a genetic trait that gives them much better than average leg strength

31. Predict how the frequency of the trait for above average leg strength would be expected to change in the population over time. Explain your prediction.

32. State what is likely to happen to the rabbits in the population that do *not* have the trait for above average leg strength.

33. It was later discovered that the rabbits born with the trait for above average leg strength also inherited the trait for poor eyesight. Taking into account this new information, explain how your predictions would change. Support your answer.

Base your answers to questions **34** and **35** on the passage below and on your knowledge of biology.

Dandelions are weeds that are very common in many grassy areas of New York State. Dandelion flowers first open up in a bright-yellow stage, and later turn a fluffy white when they are ready to release their seeds. The seeds are carried by the wind, and can sometimes travel great distances before landing and growing into new plants. The stems of dandelions are usually very long, typically about 20–30 centimeters (cm), and stand high above the surrounding grass.

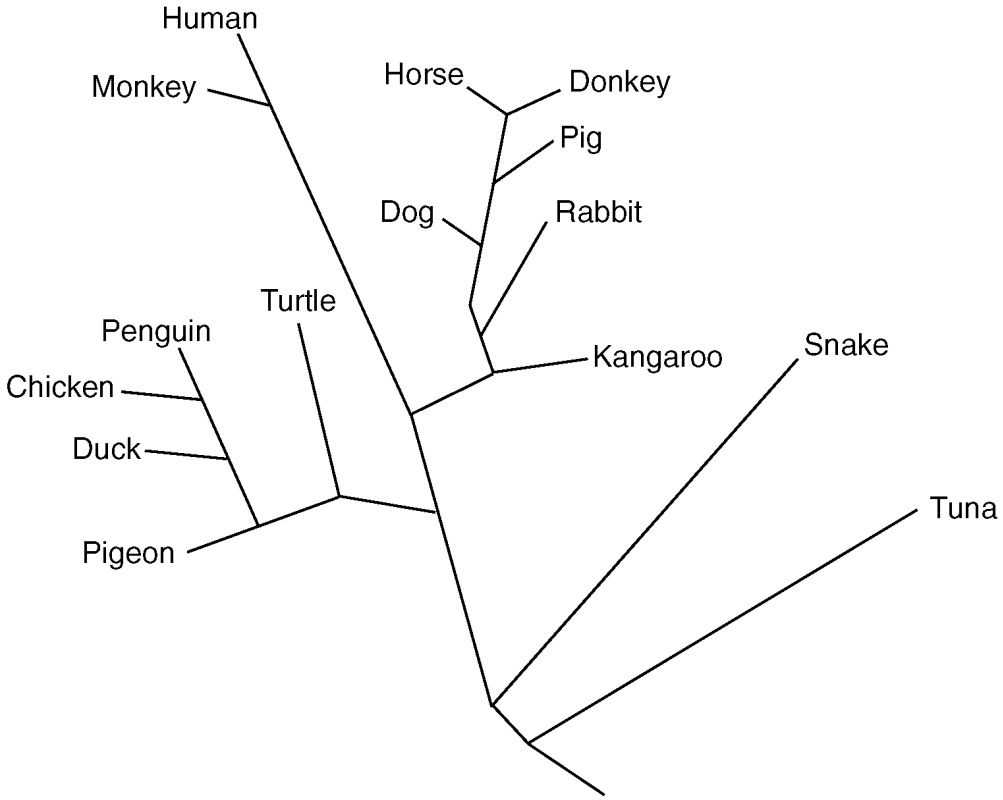
A science teacher in Niagara County discovered an area in her lawn where nearly every dandelion had a stem less than 1 cm long. These short dandelions were replacing large amounts of grass in the lawn surrounding her house. They were growing much more thickly than the taller dandelions in other nearby areas. The short dandelions appeared to be growing very successfully in one area of her lawn, but did not appear to have spread to other areas of her lawn. The science teacher noticed that every time she mowed her lawn, the short dandelions were left untouched by the mower blades, and that their numbers were steadily increasing.

34. State *one* possible cause of the genetic variation in dandelion height.

35. State *one* possible reason why the amount of grass was decreasing, while the number of short dandelions was increasing in the lawn of the science teacher.

Base your answers to questions **36** through **38** on the information below and on your knowledge of biology.

Based on their analysis of the differences in amino acid sequences of one kind of protein, scientists prepared the evolutionary tree shown below.



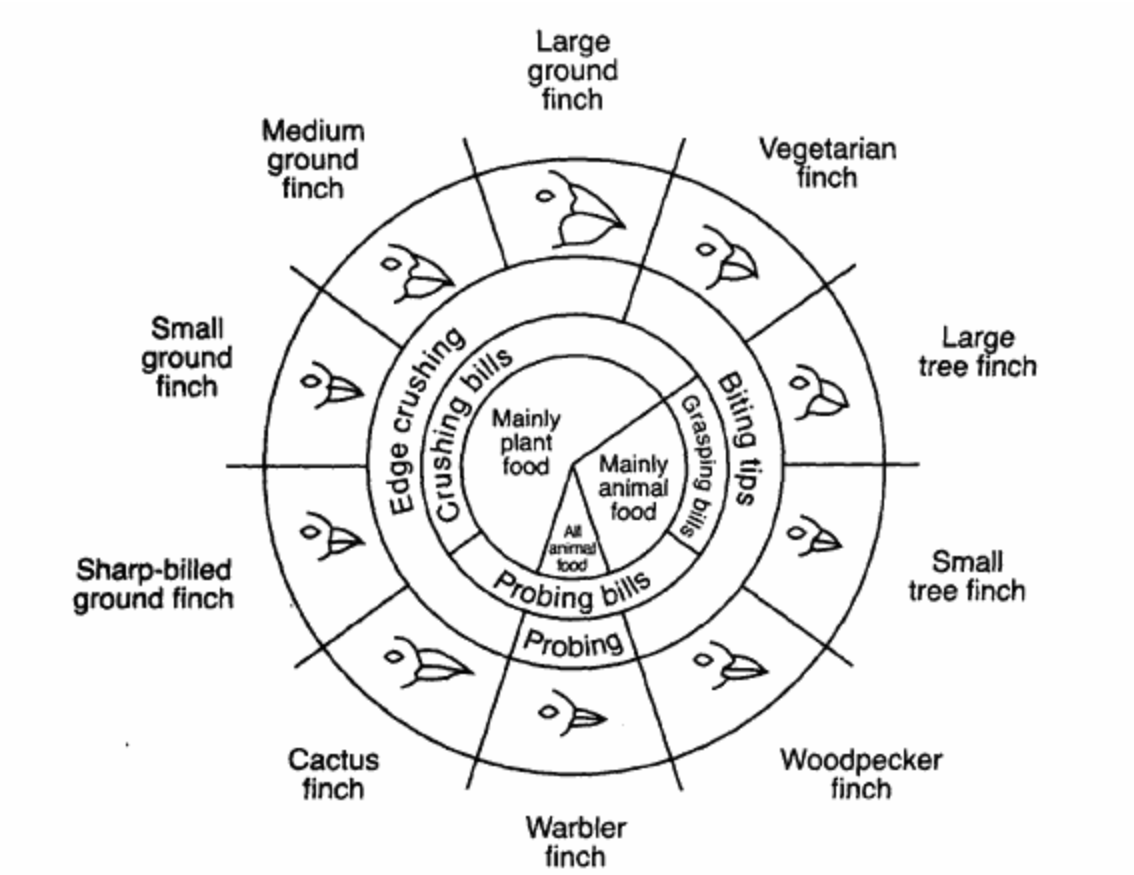
36. According to this diagram, the DNA of which pair of organisms would show the greatest similarity?

    1) penguin and turtle
    2) horse and donkey
    3) snake and tuna
    4) turtle and rabbit

37. Older systems of classification always placed penguins, chickens, ducks, and pigeons in the bird group and turtles and snakes in the reptile group. Does this diagram support the older system of classification? Explain your answer.

38. According to this diagram, is the pig more closely related to the dog or the kangaroo? Justify your answer.

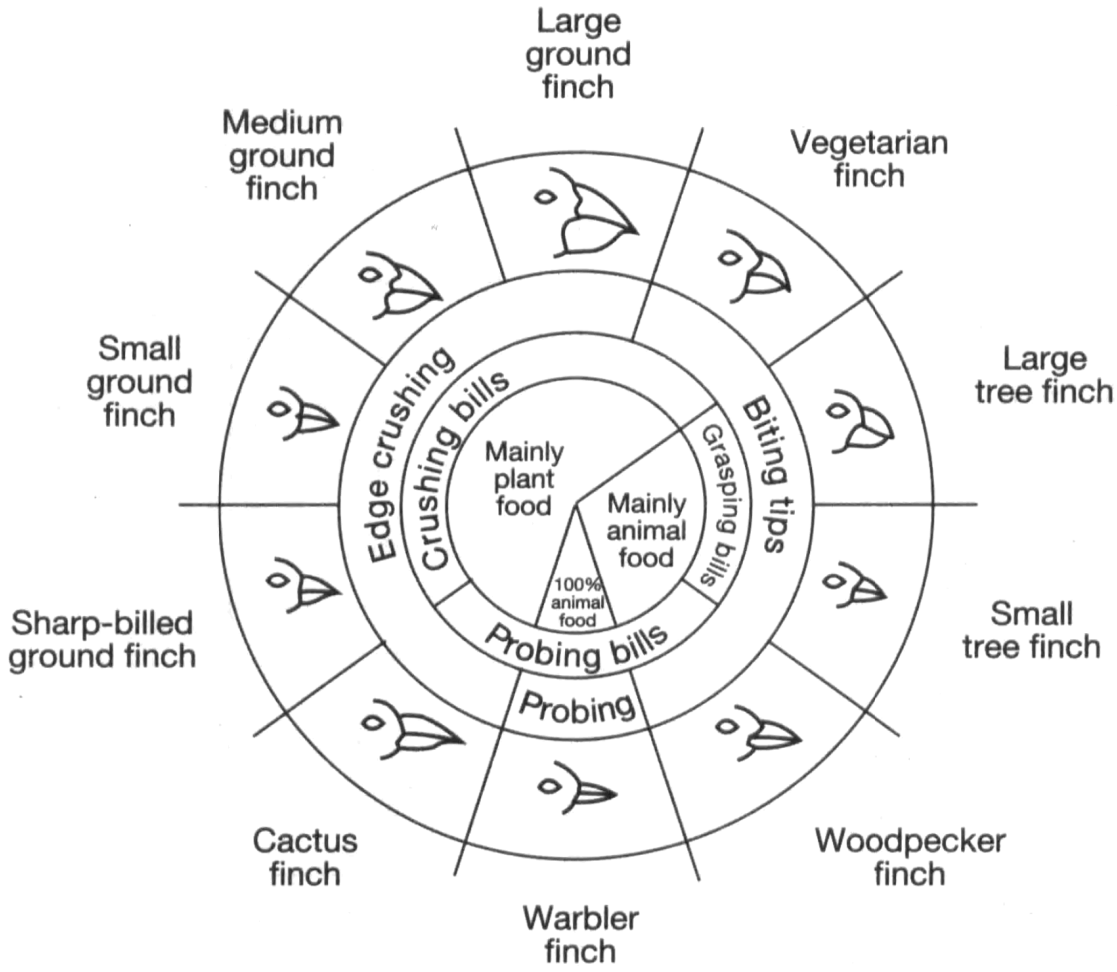
39. Base your answer to the following question on the diagram below that shows variations in the beaks of finches in the Galapagos Islands and on your knowledge of biology.



From: *Galapagos: A Natural History Guide*

State *one* reason why large ground finches and large tree finches can coexist on the same island.

Base your answers to questions **40** and **41** on the information below and on your knowledge of biology. The diagram below represents the relationship between beak structured and food in several species of finches in the Galapagos Islands.



From: *Galapagos: A Natural History Guide*

Variations in Beaks of Galapagos Islands Finches

40. State *one* reason why the large tree finch and the large ground finch are able to coexist on the same island.

41. Which factor most directly influenced the evolution of the diverse types of beaks of these finches?

    1) predation by humans
    2) available food sources
    3) oceanic storms
    4) lack of available niches

Base your answers to questions **42** through **44** on the information below and your knowledge of biology.

In the Beaks of Finches laboratory activity, students were each assigned a tool to use to pick up seeds. In round one, students acting as birds used their assigned tools to pick up small seeds from their own large dishes (the environment) and place them in smaller dishes (their stomachs). The seeds collected by each student were counted. Some students were able to collect many seeds, while others collected just a few. In round two, students again used their assigned tools to collect seeds. This time several students were picking up seeds from the same dish of seeds.

42. Identify *one* trait, other than beak characteristics, that could contribute to the ability of a finch to feed successfully.

43. One factor that influences the evolution of a species that was not part of this laboratory activity is

    1) struggle for survival
    2) variation
    3) competition
    4) overproduction

44. Explain how this laboratory activity illustrates the process of natural selection.

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45. The different tools used during the beaks of finches lab represented

    1) feeding adaptations in finches
    2) nest construction adaptations
    3) variations in seed size
    4) variations in ecosystems

Answer Key
Evolution Test

1. **3**
2. **1**
3. **3**
4. **1**
5. **4**
6. **3**
7. **1**
8. **2**
9. **3**
10. **4**
11. **4**
12. **2**
13. **3**
14. **3**
15. **2**
16. **3**
17. **1**
18. **3**
19. **2**
20. **3**
21. **1**
22. **2**
23. **3**
24. **3**
25. **1**
26. **3**
27. **4**
28. **2**
29. **2**
30. **3**

31. — The above average leg-strength trait would increase in frequency because the rabbits with the stronger legs would be more likely to get away from predators.

32. — The rabbits that do not have the stronger leg-strength trait will start to decrease in number. — They might be eaten by predators.

33. — The frequency of the trait for above average leg strength might actually decrease because the poor eyesight might be more of a disadvantage than the leg strength is an advantage.— Now it seems that the frequency will more likely decrease because they will not see well enough to get away.— The frequency of the trait for above average leg strength will remain the same because the advantage will be canceled out by a disadvantage.

34. — mutation — changes in DNA — recombinatio-n/recombining of genes

35. — The dandelions out-compete the grass for the same limited resources. — The dandelions are better adapted for survival. — The dandelions shade the grass.

36. **2**

37. Examples: — Snakes are in their own group, rather than grouped with turtles. — Turtles are on the same branch as the birds. — Snakes have one kind of protein that is very different from that found in turtles and birds.

38. Examples: — separated more recently — closer together on the tree — have a more recent common ancestor — The protein in the pig is more similar to that in the dog.

39. – Large ground finches eat mainly plant food and large tree finches eat mainly animal food. – They do not compete for the same resources, so both can survive. – They occupy different niches.

40. *Examples:* — The large tree finch eats mainly animal food, while the large ground finch eats mainly plant food. — They occupy different environmental niches.

41. **2**

42. *Examples:* — strength — vision — coordination

43. **4**

44. *Examples:* — The tools represent types of beaks, some of which are more successful for gathering and so are more favorable for survival. — Students with favorable "beaks" survived.

45. **1**